

CLAIMS

What is claimed is:

1. An analytic device with an automatic pipette, comprising:
a pipette tip receiving element coupled to a mechanism that translates the pipette
5 tip receiving element along at least two of an x-coordinate, a y-coordinate,
and a z-coordinate;
wherein the pipette tip receiving element is further operationally coupled to a
sensor that detects presence of a disposable pipette tip that is removably
coupled to the pipette tip receiving element;
10 a first energy source and a first energy detector coupled to the pipette tip
receiving element wherein the first energy source provides a first energy to a
volume that is enclosed by the pipette tip, and wherein first energy detector
receives at least a portion of the first energy from the volume;
a second energy source and a second energy detector coupled to the pipette tip
15 receiving element wherein the second energy source provides a second energy
to a surface of a biochip when the pipette tip approaches the surface of the
biochip; and
a processor electronically coupled to the first and second energy detectors,
wherein the processor controls accurate aspiration of a predetermined volume
20 using a signal from the first detector, and wherein the processor controls
movement of the pipette tip along a z-coordinate using a signal from the
second detector.
2. The analytic device of claim 1 wherein the first energy source comprises a laser,
and wherein the first energy is provided to the volume via a light guide.
- 25 3. The analytic device of claim 2 wherein the accurate aspiration is calculated from
a reflected light signal that is detected by the first energy detector.
4. The analytic device of claim 2 wherein the second energy source comprises an
ultrasound transducer.

5. The analytic device of claim 1 wherein the sensor comprises an optoelectronic sensor.
6. The analytic device of claim 1 wherein the disposable pipette tip has a volume of equal or less than 200 microliter.
- 5 7. The analytic device of claim 1 wherein the mechanism comprises a robotic arm that translates the pipette tip receiving element along the x-coordinate, the y-coordinate, and the z-coordinate.
8. The analytic device of claim 1 further comprising a data transfer interface.
9. The analytic device of claim 1 wherein the data transfer interface provides data to
10 a person other than the operator, wherein the person is optionally in a remote location relative to the analytic device.
10. The analytic device of claim 1 further comprising a sample station with a multi-well plate and a multi-reagent pack, wherein the pipette tip removes a fluid from at least one of the multi-well plate and the multi-reagent pack and dispenses the
15 fluid onto the surface of the biochip.
11. An automatic pipette in an analytic device comprising a disposable pipette tip and a first and a second sensor, wherein the first sensor detects a volume of a liquid within the pipette tip and wherein the second sensor detects a vertical distance between the pipette tip and a biochip that is disposed in the analytic device.
- 20 12. The automatic pipette of claim 11 wherein the pipette tip has a volume of equal or less than 200 microliter.
13. The automatic pipette of claim 11 wherein the first sensor comprises a laser that delivers a laser beam into the pipette tip.
14. The automatic pipette of claim 13 wherein the volume of the liquid is determined
25 using at least one of a destructive interference, a constructive interference, a phase modulation, and a triangulation.

15. The automatic pipette of claim 11 wherein the second sensor comprises an sound transducer that delivers a sound beam to a surface of the biochip.
16. The automatic pipette of claim 15 wherein the vertical distance is determined using a time-of-flight calculation.
- 5 17. The automatic pipette of claim 11 wherein first and second sensors are coupled to a robotic arm that moves the pipette along at least one of an x-coordinate, a y-coordinate, and a z-coordinate.
18. The automatic pipette of claim 11 further comprising a third sensor that detects coupling of the disposable pipette tip to the automatic pipette.
- 10 19. The automatic pipette of claim 11 further comprising a data transfer interface.
20. The automatic pipette of claim 11 wherein the data transfer interface provides data to a person other than the operator, and wherein the person is optionally in a remote location relative to the analytic device.